

Claims

[c1] A check valve comprising an outer body having an inner bore, and a shuttle arranged within said inner bore to move relative to said inner bore between a closed checking position locking flow of liquid through said check valve, and an open position allowing for a flow of liquid through said check valve, and a resilient means biasing a position of said shuttle toward said closed checking position, wherein said shuttle has a downstream portion, an upstream portion and a middle portion, each portion engaging or engageable with a sliding fit in said inner bore and such that, when in said closed checking position, said middle portion engages with a sealing engagement, said inner bore.

[c2] A check valve comprising an outer bore having an inner bore and a shuttle arranged within the inner bore to move relative to the inner bore between a closed checking position locking fluid of liquid through the valve, and an open position allowing for flow of liquid through the valve, and a resilient means biasing the position of the shuttle towards said closed position, characterized in that the shuttle has a downstream portion, an upstream

portion and a middle portion, each portion engaging or engageable with a sliding fit the bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal, a sealing engagement of the inner bore.

[c3] The check valve as in claim 1 wherein said shuttle when in an open position allows said flow of liquid to be directed through a passage which first is through a passageway the shuttle, then through the outer body, and then through the shuttle to an outlet end of the body.

[c4] A check valve comprising an outer body having an inner bore and a shuttle arranged within the inner bore to move relative to the inner bore between a closed checking position blocking flow of liquid through the valve, and an open position allowing for flow of liquid through the valve, and a resilient means biasing the position of the shuttle towards said closed position, characterized in that the shuttle has a downstream portion, an upstream portion and a middle portion, each portion engaging or engageable with a sliding fit of the inner bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal, the sealing engagement of the inner bore and, when in an open position, arranged that the liquid will flow around the middle portion.

[c5] A check valve comprising an outer body having an inner bore and a shuttle arranged within the inner bore to move relative to the inner bore between a closed checking position blocking flow of liquid through the valve, and an open position allowing for flow of liquid through the valve, and a resilient means biasing the position of the shuttle toward the said closed position, characterized in that the shuttle has a downstream portion, an upstream portion and a middle portion, each portion engaging or engageable with a sliding fit, the inner bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal, a sealing engagement the inner bore and when in an open position it is arranged that the liquid will flow through a passage around a middle portion which passage includes at least a path through the outer body.

[c6] A check valve comprising an outer body having a cylindrical inner bore, and a shuttle arranged within the inner bore to move relative to the inner bore, and adapted to move between a closed checking position blocking flow of liquid through the valve, and an open position allowing for the flow of liquid through the valve, and a helical spring comprising resilient means, biasing the position of the shuttle towards said closed position, characterized in that the shuttle has a downstream portion, an up-

stream portion and a middle portion, each portion engaging or engageable with the sliding fit the inner bore of the outer body and being such that, when in a closed position, the middle portion engages with a flexible seal a sealing engagement the inner bore and when in an open position, it is arranged that the liquid will flow through a passage around the middle portion which passage includes at least a path through the outer body and where the passageway includes a streamline alignment through the shuttle to the path through the outer body.

[c7] The check valve as in claim 6 wherein said flexible seal is held with the shuttle.

[c8] The check valve as in claim 6 wherein said flexible seal is held with the outer body.

[c9] The check valve as in claim 6 wherein said flexible seal is an O-ring.

[c10] The check valve as in claim 6 wherein said flexible seal is a bucket seal.

[c11] The check valve as in claim 10 wherein said flexible seal effects a sliding and therefore wiping action between the respective surfaces as it is urged into a closed position with respect to the valve of the body.

[c12] The check valve as in claim 11 wherein said flexible seal effects a sliding and therefore wiping action between the respective surfaces as it is urged into a closed position with respect to the valve of the body.

[c13] The check valve as in claim 7 wherein said shuttle is supported by engaging surfaces which are at an outermost diameter of the shuttle in the case that the shuttle and the bore are of circular cross section or define a circular periphery.